

Francis Edward Su

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Degrees

- 1995 Ph.D. in Mathematics, Harvard University.
Dissertation: Methods for Quantifying Rates of Convergence for Random Walks on Groups.
Advisor: Persi Diaconis.
- 1992 A.M. in Mathematics, Harvard University.
- 1989 B.S. in Mathematics, The University of Texas at Austin.
With Highest Honors (summa cum laude) as well as Special Honors in Mathematics.
Graduated at age 19.

Experience

- 2006 - Professor of Mathematics, Harvey Mudd College.
- Fall 2009 Visiting Associate in Mathematics, Caltech.
- Fall 2003 Member, Mathematical Sciences Research Institute, Berkeley, CA.
- 2002 - 2006 Associate Professor of Mathematics, Harvey Mudd College.
- 2001 - 2002 Research Group Fellow, ZiF (Zentrum für interdisziplinäre Forschung), Bielefeld, Germany.
- Spring 2000 Visiting Assistant Professor, School of Operations Research, Cornell University.
- 1996 - 2002 Assistant Professor of Mathematics, Harvey Mudd College.

Honors and Awards

- 2007 - 2010 NSF Research Award, \$114,468.
- 2006 James R.C. Leitzel Lecturer, 2006 MAA MathFest.
- 2003 - 2006 NSF Research Award, \$146,640.
- 2004 The 2004 Henry L. Alder Award for Distinguished Teaching by a Beginning College or University Faculty Member, awarded by the MAA (Mathematical Association of America)
- 2001 - 2002 Iris and Howard Critchell Assistant Professorship, Harvey Mudd College
endowed junior faculty chair, for excellence in teaching and mentorship
- 2001 The 2001 Merten M. Hasse Prize for outstanding mathematical exposition
awarded by the MAA (Mathematical Association of America)
- 2000 Cornell University INFORMS/IIE special Teaching Excellence Award
- 1996 - 1997 MAA Project NExT Fellow
- 1994 - 1996 Harvard University Derek Bok Center Annual Awards for Distinction in Teaching
- 1989 - 1992 NSF Graduate Fellowship
- 1987 Phi Beta Kappa, junior inductee

Professional Activities

- First Vice-President Elect, Mathematical Association of America (2010-2012).
- Council of American Mathematical Society (2007-2010).

Editorial Board, AMS Pure and Applied Undergraduate Texts (2009-2013).
 MAA Leitzel Lecture Committee (2008-2011).
 AMS Committee on the Profession (2007-2010).
 Editorial Board, American Mathematical Monthly (2006-2011).
 Chair, AMS Short Course Committee (2006-2008).
 Editorial Board, Math Horizons, (2003-2008).
 Chair, MAA Hasse Prize Committee (2005-09).
 AMS Short Course Committee (2005-08).
 Chair, MAA MathFest Program Committee: to choose speakers for the National Summer MAA
 (Mathematical Association of America) Meetings in August 2005 in Albuquerque.
 MAA Program Committee for the 2004 AMS-MAA Joint Math Meetings, Phoenix, AZ.
 MAA Spectrum Book Series Editorial Board (2000-03).
 MAA Subcommittee on Applications of the Committee on Professional Development (2000-03).

Research Interests

Discrete geometry & combinatorial topology: triangulations of polytopes, simplicial algorithms,
 and applications to mathematical economics, game theory.

PUBLICATIONS

(Note that in pure mathematics, the authorship convention is alphabetical.)

Papers written with undergraduate co-authors are starred*.

All papers are available for download at: <http://www.math.hmc.edu/~su/papers.html> .

Refereed Papers (to appear)

D. Berg*, S. Norine, F.E. Su, R. Thomas, and P. Wollan, Voting in agreeable societies, to appear, Amer. Math. Monthly, January 2010.

F.E. Su, The agreeable society theorem
 To appear, in Bay Area Mathematical Adventures, vol. II, (Tatiana Shubin, ed.) MAA, forthcoming.

C.J. Haake and F.E. Su, Fair division procedures: why use mathematics?
 To appear, in Procedural approaches to conflict resolution, (Matthias Raith, ed.) Springer-Verlag, forthcoming.

Refereed Papers (in print)

22. C.J. Haake, A. Kashiwada*, and F.E. Su, The Shapley value of phylogenetic trees, J. Math. Biol. 56 (2008), 479–497.

21. D. Rizzolo* and F.E. Su, A fixed point theorem for the infinite-dimensional simplex, J. Math. Anal. Appl. 332 (2007), 1063–1070.

20. G. Spencer* and F.E. Su, The LSB theorem implies the KKM lemma. *The American Mathematical Monthly* 114 (2007), pp. 156-159.
19. T. Prescott* and F.E. Su, A constructive proof of Ky Fan's generalization of Tucker's lemma, *J. Combin. Theory Ser. A* 111(2005), 257–265.
18. A. Bliss* and F.E. Su, Lower bounds for simplicial covers and triangulations of cubes, *Discrete Comput. Geom* 33 (2005), 669–686.
17. D. Hensley and F.E. Su, Random walks with badly approximable numbers. *Unusual Applications of Number Theory*, 95-101, DIMACS Series on Discrete Mathematics and Theoretical Computer Science 64, American Mathematical Society, 2004.
16. T. Prescott* and F.E. Su, Random walks on the torus with several generators. *Random Structures and Algorithms* 25 (2004), 336–345.
15. F.W. Simmons and F.E. Su, Consensus-halving via theorems of Borsuk-Ulam and Tucker. *Mathematical Social Sciences* 45(2003), 15–25.
14. A.T. Benjamin, C. Hanusa*, and F.E. Su, Linear recurrences through tilings and Markov chains. *Utilitas Mathematica* 64(2003), 3–17.
13. J.A. De Loera, E. Peterson*, and F.E. Su, A polytopal generalization of Sperner's lemma. *J. Combin. Theory Ser. A* 100(2002), 1–26.
12. A.L. Gibbs and F.E. Su, On choosing and bounding probability metrics. *Internat. Statist. Rev.* 70(2002), no. 3, 419–435.
11. E. Peterson* and F.E. Su, Four-person envy-free chore division. *Math. Mag.* 75 (2002), 117–122.
10. C.J. Haake, M.G. Raith, and F.E. Su, Bidding for envy-freeness: a procedural approach to n -player fair division problems. *Social Choice and Welfare* 19(2002), 723–749.
9. F.E. Su, Discrepancy convergence for the drunkard's walk on the sphere, *Electron. J. Probab.* 6 (2001), paper no. 2, 1–20.
8. M.G. Raith and F.E. Su, Procedural support for cooperative negotiations, in *Advances in Decision Technology and Intelligent Information Systems*, Vol. I, K.J. Engemann and G.E. Lasker, eds., IIAS, Windsor, Canada, 2000, pp. 31–36.
7. A.T. Benjamin, J.J. Quinn, and F.E. Su, Phased tilings and generalized Fibonacci identities, *Fibonacci Quart.* 38 (2000), 282–288.
6. A.T. Benjamin, J.J. Quinn, and F.E. Su, Counting on continued fractions, *Math. Mag.* 73 (2000), 98–104.
5. F.E. Su, Book review: *Cake-Cutting Algorithms* by J. Robertson and W. Webb, *Amer. Math. Monthly* 107 (2000), 185–188.

4. F.E. Su, A LeVeque type lower bound for discrepancy, in Monte and Quasi-Monte Carlo Methods 1998, H. Niederreiter and J. Spanier, eds., Springer-Verlag 2000, pp. 448–458.
3. F.E. Su, Rental harmony: Sperner’s lemma in fair division, Amer. Math. Monthly 106 (1999), 930–942.
This paper was selected by the Mathematical Association of America to receive the 2001 Merten M. Hasse Prize for outstanding mathematical exposition.
2. F.E. Su, Convergence of random walks on the circle generated by an irrational rotation, Trans. Amer. Math. Soc. 350 (1998), 3717–3741.
1. F.E. Su, Borsuk-Ulam implies Brouwer: a direct construction, Amer. Math. Monthly 104 (1997), 855–859.

Other Writings

- F.E. Su, Magical Miscellany,
Math Horizons, February 2004, 28–29.
- A.J. Bernoff and F.E. Su, Putnam, Pizza, and Problem-Solving,
Math Horizons, September 2004.

Other Notable Projects

- Project Director / Author, The Fair Division Calculator v.3.2, web applet, copyright 1998-2000. The applet implements several fair division procedures outlined in my papers. The applet received a web award from the Canadian Math Society and was featured in articles in Science, ScienceNews, and on the radio show ScienceUpdate. The applet was developed with the assistance of P. Vinograd* and E. Peterson*,
Available at www.math.hmc.edu/~su/fairdivision/.
- Project Director / Author, Mudd Math Fun Facts, website, copyright 1999-2005. The site is an archive of over 160 interesting mathematical facts, aimed at popularizing mathematics. Since its inception, it has received over 2 million hits as well as web awards from the Canadian Math Society, Eisenhower National Clearinghouse, Education Planet, and USA Today. The site code was developed with the assistance of C. Jones*.
Available at www.math.hmc.edu/funfacts/.
- Mathematics Editor, For All Practical Purposes: Mathematical Literacy in Today’s World, textbook, 6th edition, W.H. Freeman and Co., 2003.

PROFESSIONAL TALKS (recent only)

Invited Conference Talks (recent)

- Featured speaker, Bay Area Mathematics Olympiad, MSRI, Berkeley, 3/8/09.
Featured speaker, Texas Undergraduate Mathematics Conference, Sam Houston State University, 9/27/08.
Plenary speaker, MAA Michigan Section Meeting, 5/2/08.
Plenary speaker, Barrett Lectures, University of Tennessee, 4/27/08.
Plenary speaker, MAA Seaway Section Meeting, Syracuse University, 4/12/08.
MAA Invited Address: Student Lecture, MAA MathFest, 8/4/07.
Plenary speaker, Communicating Mathematics, conference in honor of Joe Gallian, 7/16/07.
Plenary speaker, MAA Metro-NY Section Meeting, 5/6/07.
Keynote speaker, MAA Ohio Section Meeting, 4/13/07.
Keynote speaker, 2nd Biennial Undergraduate Research Conference and MAA Georgia State Lunch, Mercer University, 2/24/07.
Keynote speaker, MAA Indiana Section Meeting, Valparaiso University, 10/14/06.
James R.C. Leitzel Lecturer, 2006 MAA MathFest, Knoxville, TN, 8/11/06.
Public Choice Society Meetings, New Orleans, 4/1/06.
MAA Invited Address, 2006 AMS-MAA-SIAM Joint Winter Meetings, San Antonio, TX, 1/12/06.
Plenary speaker, Inside the Cube: Algebra, Combinatorics, and Geometry, University of Magdeburg, Germany, 7/1/05.
Society for the Advancement of Economic Theory Conference, Vigo, Spain, 6/27/05.
AMS Special Session on Discrete Geometry, Mainz, Germany, 6/17/05.
Invited Address, Southern California MAA Meeting, University of Southern California, 3/5/05.

Invited Colloquia and Seminars (recent)

- Colloquium, Westmont College, 2/6/09.
Combinatorics Seminar, Claremont, 12/9/08.
Evening speaker series, Gustavus Adolphus College, 5/1/08.
Colloquium, Arizona State University, 4/23/08.
Invited Colloquium, Loyola Marymount University, 11/18/07.
Mathematics Colloquium, Valparaiso University, 10/16/07.
Invited Lecture, High Point University, 10/1/07.
Invited Lecture: Bernard Society Lecture, Davidson College, 9/30/07.
Invited Colloquium, James Madison University, 9/28/07.
Invited Evening Speaker Series, University of Virginia, 9/27/07.
Mathematics Colloquium, Westmont College, 12/02/05.
Claremont REU Colloquium, 7/21/05.
ACO Colloquium, Department of Mathematics, Georgia Tech, 4/29/05.
Operations Management Workshop, Graduate School of Business, University of Chicago, 12/09/04.

OTHER SCHOLARLY ACTIVITY

Grants

- 2007-2010 NSF Research Award, \$114,468
RUI: Combinatorial Fixed Point Theorems, Polytopes, and Preference Sets.
- 2003-2006 NSF Research Award, \$146,640.
RUI: Combinatorial Fixed Point Theorems, Polytopes, and Fair Division.
- 2005 MAA PREP Grant, \$20,070.
Geometric Combinatorics workshop at MSRI.
- 2004 MAA PREP Grant, \$28,401.
Geometric Combinatorics workshop at MSRI.
- 2003-2004 HMC Faculty Research Grant, \$5,600.
Triangulations of Polytopes and Applications.
- 2002-2003 HMC Faculty Research Grant, \$6,200.
Applications of Combinatorial Topology to Fair Division Problems.
- 2001-2002 Beckman Research Grant, \$8,100.
Applications of Combinatorial Topology to Fair Division Problems.
- 2000-2001 Christian Scholars Foundation Travel Grant, \$2,500.
- 2000-2001 Mellon Foundation Grant, \$7,200.
A Web-Based Archive of Mathematical Fun Facts, part II.
- 1999-2000 Beckman Research Grant, \$9,200.
Fair Division: Theory and Implementation.
- 1999-2000 Mellon Foundation Grant, \$4,550.
A Web-Based Archive of Mathematical Fun Facts.
- 1998-1999 Beckman Research Grant, \$8,600.
Topological Methods in Fair Division.
- 1997-1998 Beckman Research Grant, \$7,900.
Faster Rates of Convergence for Random Walks on the Circle and Sphere.

Refereeing

- 2008 Journal of Combinatorial Theory Ser. A, Games and Economic Behavior, AMS Notices,
- 2007 Journal of Combinatorial Theory Ser. A, American Mathematical Monthly,
Discrete and Computational Geometry,
- 2006 Journal of Combinatorial Theory Ser. A, European Journal of Combinatorics,
Discrete and Computational Geometry, American Mathematical Monthly,
- 2005 Journal of Combinatorial Theory Ser. A, Mathematical Programming, American Mathematical Monthly,
- 2004 ISSAC '04: International Symposium, Symbolic and Applied Computation, Mathematical Social Sciences,
Discrete and Computational Geometry, American Mathematical Monthly, Social Choice and Welfare,
- 2003 NSF Research Proposal Review in Applied Mathematics, Mathematical Social Sciences,
Discrete and Computational Geometry, Mathematical Programming, Social Choice and Welfare,
- 2002 Random Structures and Algorithms, Social Choice and Welfare, Topology and its Applications,
American Mathematical Monthly,
- 2001 Journal of Mathematical Analysis and its Applications, American Mathematical Monthly,
- 2000 Mathematics of Operations Research, Mathematical Social Sciences,
- 1999 Mathematics Magazine, American Mathematical Monthly,
- 1997 MAA Spectrum Book Series.

Professional Memberships

American Mathematical Society (1989-).

Mathematical Association of America (1996-).

Other

Organizer, HMC Mathematics Conference Series: Geometry, Algebra, and Phylogenetic Trees, Department of Mathematics, Harvey Mudd College, October 23, 2004.

Co-Organizer, MAA Panel Discussion: Statistics and Mathematical Modeling: Lively Applications for the Classroom, Joint Math Meetings, January 2001.

Co-Organizer, Southern California Project NExT Chapter, Joint MAA-SIAM Meeting, Southern California Section, Pepperdine U., 10/17/98.

Organizing Committee, Third International Conference on Monte Carlo and Quasi Monte Carlo Methods, hosted by Claremont Graduate University and Harvey Mudd College, June 22-26, 1998.

COLLEGE SERVICE

Courses taught

Abstract Algebra II (Galois theory, representation theory) (Math 172): S'02, S'08
 Algebraic Topology (simplicial/singular homology theory) (Math 177/189): F'01, S'06, F'07
 Social Choice and Decision Making (IE course, Math 188): S'03, F'04, F'07
 Geometric Combinatorics and Polytopes (Math 189): S'04
 Game Theory (SPE 315, at Claremont Graduate University) F'01, (ORIE 435, at Cornell) S'00
 Topology (Math 147): S'99, S'01, S'03, S'05
 Probability (Math 151, 157): S'98, S'04b
 Real Analysis II (Math 132): F'96, F'97, F'98, F'99, F'00, F'06
 Real Analysis I (Math 131): S'07, S'08, S'09
 Science and Religion (Religious Studies 184s): S'06
 Introduction to Probability and Statistics (Math 62): F'02b, Summer'07, Summer'08,
 Multivariable Calculus, part II (Math 61): S'02, F'09a
 Calculus (Math 11): F'00
 Multivariable Calculus, part I (Math 14): S'99, S'01, S'04b, S'05b, S'06a, S'09a
 Differential Equations, part I (Math 13): S'99
 Linear Algebra and Discrete Dynamical Systems (Math 12): F'98, F'01, F'02, F'04b, F'05ab, F'06b
 Multivariable Calculus (Math 4) S'97, S'98; (Math 5) F'99
 Calculus (Math 3): F'96, F'97
 Mathematics Clinic (Math 193): '08-'09.
 Putnam Seminar (Math 191): F'96, F'97, F'98, F'99, F'00, F'01, F'02, F'04, F'05, F'06, F'07, F'08

Research/thesis students

Sarah Fletcher '09 (thesis)
 Natalie Durgin '09 (summer '08, thesis)
 Helen Highberger '09 (summer '08, thesis)
 Jacob Scott '11 (summer '08)
 Parousia Rockstroh '08 (thesis)
 Tia Sondjaja '08 (summer '07, thesis)
 Aaron Mazel-Gee (Brown, summer '07)
 Kyle Kinneberg (Claremont McKenna, summer '07)
 Michael Hansen '07 (thesis)
 Herbie Huff '07 (fall '06)
 Alex Izsak '07 (summer '06)
 Douglas Rizzolo '08 (summer '06, fall '07)
 Nicholas Rauh '06 (thesis)
 Deborah Berg '06 (summer '05, thesis)

Tyler Seacrest '06 (summer '05, summer '04)
 Gwen Spencer '05 (summer '04)
 Akemi Kashiwada '05 (summer '04, thesis)
 Carl Yerger '05 (thesis)
 Andrew Niedermaier '04 (summer '03)
 Adam Bliss '03 (summer '02, thesis)
 John Cloutier '03 (summer '02, thesis)
 Timothy Prescott '02 (spring/summer '01, thesis)
 Joshua Greene '02 (thesis)
 Mark Dean '02 (thesis)
 Karl Mahlburg '01 (summer '99, thesis)
 Chris Hanusa '01 (thesis)
 Elisha Peterson '00 (summer '98, thesis)
 Michael Lauzon '00 (thesis)
 Patrick Vinograd '02 (summer '99)
 Andromeda Yelton '99 (summer '97)

HMC Mathematics Conference Series

I organized the 2004 HMC Mathematics Conference Series: Geometry, Algebra, and Phylogenetic Trees at Harvey Mudd College on October 23, 2004. Invited speakers included: Bernd Sturmfels (UC-Berkeley), Susan Holmes (Stanford), Michael Hendy (Massey, New Zealand), David Bryant (McGill, Canada).

Clinic consulting

Citadel Investment Group Mathematics Clinic 2008-09, faculty advisor.
 Space Systems-Loral Mathematics Clinic 1998-99, consultant.
 Aerojet Mathematics Clinic 1997-98, consultant.
 Beckman Mathematics Clinic 1996-97, consultant.

Reading courses

George Tucker, Ted Spaide, Kenji Kozai, Spring 2008 — Differential Forms in Algebraic Topology, by Bott/Tu.
 Ben Preskill, Kenji Kozai, Ivan Ventura, Spring 2007 — Differential Topology, by Guillemin/Pollack.
 Ari Nieh, Spring 2001 — Galois theory, book by D.J.H. Garling.
 Elisha Peterson, Spring 1999 — graduate algebraic topology, book by Greenberg and Harper.
 Jenni Voelmeck, Spring 1999 — number theory
 Sarah Kerbeshian (POM), Helen Wong (POM), Spring 1999 — second-semester real analysis, book by W. Rudin.
 Brian Johnson, Jessica Sidman (SCR), Brian Fisher (POM), Spring 1997 — complex function theory, book by Ahlfors.
 Kan Yasuda, Fall 1996 — representation theory of finite groups, book by Serre.

College committees

Strategic Vision Curriculum Implementation Committee (2008), Chair (2008)
Strategic Vision Curriculum Committee (2007-08), Chair (2008)
Faculty Executive Committee (2006 -)
Committee on Student Personal Development (2005 - 2006)
Ad Hoc Committee on Summer Student Programs (Summer 2005)
Core Coordinators Committee (2005)
Curriculum Committee (2004 - 2005)
Teaching and Learning Committee (1998 - 2003). Chair (Fall 1999, 2000 - 2001).
Assessment Committee (2001 - 2002).
Ad Hoc Committee on College Size (Spring 2001).
Freshman Division Coordinators (1997, 1998, 2000, 2001).
Student-Faculty Committee (1997 - 1998).
Math Department Search Committee (2004 - 2005).
Math Department Library Committee (1996 - 2003).
Math Department Core Math Reform Committee (1997 - 1998).
Freshman Mentor (Fall 1997 -).